Week 7
MATH 34A
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8. If we replace x by $5x$ in the formula for e^x we get

$$e^{5x} = 1 + (5x) + \frac{(5x)^2}{2!} + \frac{(5x)^3}{3!} + \frac{(5x)^4}{4!} + \frac{(5x)^5}{5!} + \frac{(5x)^6}{6!} + \cdots$$

What is the derivative of the right hand side (enter the first five nonzero terms)?

22. Air is pumped into a spherical balloon, so the balloon expands. The volume of a sphere of radius R is $\frac{4}{3}\pi R^3$. If the radius of the sphere after t seconds is $2t$ centimeters, at what rate is air being pumped in when $t = 5$? (Hint: the rate air is pumped in equals the rate that the volume of the sphere increases).

54. A sports field is to have the shape of a rectangle with semi-circles put on the two ends. It must have a perimeter of 1300 meters. What is the maximum area possible for the rectangular part.

55. What point on the graph $y = \sqrt{x}$ is closest to $(10, 0)$? (Hint: work out the square of the distance of a point on the curve from $(10, 0)$ and minimize the distance squared, this makes the algebra easier).